

SCIENCE PANEL

October 30, 2009

TO: William Ruckelshaus, Chair, PSP Leadership Council

FROM: Joel Baker, Chair, PSP Science Panel

SUBJECT: Science Panel Comments on Progress Implementing the 2008 Action Agenda

Background and Scope

This memorandum addresses the assignment in RCW 90.71.370(3) that the State of the Sound report includes “comments by the (Science) panel on progress in implementing the plan (*i.e.*, the Action Agenda), as well as findings arising from the assessment and monitoring program.” To meet this charge, this memorandum consists of the following:

1. An interpretation of the charge, defining terms and defining the scope of the memorandum,
2. Progress and opportunities in establishing ecosystem indicators, benchmarks, and goals,
3. Progress and opportunities in understanding linkages between actions and results,
4. Progress and opportunities in building the necessary science-policy dialog, and
5. Progress and opportunities in building a sustainable capacity for monitoring, analysis, research, and evaluation.

The Purpose and Scope of this Memorandum

The purpose of this memorandum is to provide a perspective on the key science-policy issues facing the Puget Sound Partnership as they wrote and began to implement the Action Agenda while building a new state agency during a time of economic downturn. The legislation establishing the Puget Sound Partnership, including the Leadership Council, the Ecosystem Coordination Board, and the Science Panel, calls for an appropriately aggressive approach to address the worsening conditions in the Puget Sound.

The prescribed workload and schedule, likely reflecting both the urgency of the situation and concern about ineffective and uncoordinated efforts in the past, requires an extremely ambitious and aggressive effort based on science. This establishes a natural but healthy tension between ‘do it now’ and ‘do it better.’ As we review the considerable progress made in writing and implementing the 2008 Action Agenda, we remind the reader of this tension, which sits at the heart of any scientifically-complex endeavor.

In this memorandum, we focus on the deliberations and actions of the Puget Sound Partnership during the time when the first Action Agenda and companion Biennial Science Workplan were being drafted, reviewed, and approved. Our goal is to comment constructively on how and where science was used to inform both the evolution of the Partnership and the content of the Action Agenda. This scope of this review therefore goes beyond ‘implementation of the plan’ to include decisions made during the development of the Action Agenda. As the creation, implementation, and revision of the Action Agenda, the evolving organization and operation of the Partnership, and the development of better Puget Sound science are intertwined, this review

touches on all aspects of Partnership activities. In addition, the high priority and focus placed on developing the Action Agenda within one year of creating the Partnership, precluded developing a reasoned and focused scientific assessment to identify and rank hazards and threats to the ecosystem, limited the ability to establish a baseline monitoring program to inform adaptive learning from ongoing restoration, and lessened the ability to scientifically prioritize needed actions.

Findings from selected assessment and monitoring results are summarized in the *Ecosystem Status and Trends* section of the *State of the Sound* report. The Science Panel reviewed the status and trends and assisted in preparation of the overall ecosystem summary at the beginning of that chapter. In the interest of brevity, those results are not repeated in this memorandum. To be clear, what we know about the status and trends of the Puget Sound ecosystem is based largely on observations and analyses done prior to 2008, as there simply has not been sufficient time for Partnership activities, including implementation of the Action Agenda, to be reflected in demonstrable improvements in the Puget Sound.

This memorandum does not review the analysis of program effectiveness presented in the 2009 State of the Sound report, as these sections were prepared in parallel and were outside our purview.

Establishing Ecosystem Indicators, Benchmarks, and Goals

The foundational goal of the Puget Sound Partnership is to insure 'a healthy Puget Sound by 2020,' interpreted to the public as a Sound that is 'fishable, swimmable, and diggable.' While a laudable goal, almost immediately the Partnership was faced with the prospect of more explicitly defining 'healthy' within the context of measurable outcomes. The term 'ecosystem health' is subjective and has no universally accepted definition. The demands for program accountability suggest a framework in which ecosystem health is defined (the goal), the current condition assessed (the starting point), and a schedule with mileposts (benchmarks) developed. Selection of ecosystem indicators is largely a scientific process, informed by policy, while selection of goals and benchmarks is clearly policy informed by science. Scientists may advise policy makers on whether chosen actions and benchmarks will likely meet the stated goals.

Establishing ecosystem indicators, benchmarks, and goals is more difficult than it may first appear, as each step of the way requires technical data and policy decisions informed by science. Such a framework has the apparent advantage of specific numeric targets achieved by certain dates, which is often seen as driving actions. However, there may be a false sense of certainty in the numbers, as the framework implies that the underlying relationships between cause and effect are quantitatively understood.

Progress: The Partnership engaged the scientific community through an Indicators Workgroup to review and refine the broad collection of ecosystem indicators used elsewhere and previously in the Puget Sound. This activity built strong ties with a large number of ecosystem scientists and provided an early signal that the Partnership valued input from the community. Through a series of workshops, the Indicators Workgroup substantially narrowed the number of indicators that were available to serve the needs of the Partnership. The Science Panel and the Leadership Council used this list of provisional indicators to identify the 'reporting indicators' currently available to assess the state of the Sound.

Since a comprehensive set of ecosystem indicators and the rigorous data needed to support them are still under development, the analysis provided in the 2009 State of the Sound should be considered transitional in nature providing a link between previous State of the Sound

summaries and the evolving ecosystem reporting framework being developed for the Partnership. Coincident with the development of indicators, the Partnership examined frameworks to evaluate stressors and pressures on the ecosystem, with the goal of understanding and communicating the relative importance of different 'drivers' of ecosystem degradation. The Partnership leveraged work done by a national-scale NOAA 'Integrated Ecosystem Assessment' program to further develop the framework and models necessary to rationally understand current conditions, stressors, and the meaning of ecosystem health.

Opportunities: Continued analysis of potential ecosystem indicators, especially those capturing the human health and human well being goals is needed. Another important component of the ecosystem reporting framework that is incomplete is setting targets and benchmarks for some or all of the ecosystem indicators. This is a very difficult task requiring integration of ecological sciences, perhaps economic and engineering feasibility analyses, and policy debate and deliberations. In the end, setting targets and benchmarks will require Puget Sound leaders to make informed policy decisions, likely based on weight-of-evidence arguments, to guide restoration and protection actions. The Partnership will need to continue to balance the desire for benchmarks and targets against the difficulties in choosing rational and defensible numbers, and must continue dialog to clarify what can be expected from this framework. The principles of adaptive management may likely result in changing goals as more information becomes available.

Understanding Linkages Between Actions and Results

Complex systems such as the Puget Sound ecosystem consist of myriad of interrelated components. Developing management actions to restore and protect the Sound requires understanding the relationship between actions and results in the ecosystem. Some linkages are, for example, straightforward discharge of copper-containing wastewater into an embayment increases levels of this metal in the local environment and may directly affect survival of biota, specifically returning adult salmon. Many other relationships are indirect—elevated levels of copper in a stream may subtly affect neural develop in juvenile salmon, which in turn may harm the fishes ability to evade predation, which leads to fewer adult salmon returning to the stream years later. Meanwhile, increasing population growth may exert even more pressure on the ability of natural systems to provide ecosystem services. Clearly, identifying the dominant logical sequences from external stressors to impacts is required for a rational, accountable ecosystem management program. Addressing environmental issues at the ecosystem scale will require addressing social, economic, energy, transportation, and other issues as well.

Progress: The Partnership has taken important first steps to identify and articulate these 'results chains' through the use of the 'Open Standards' framework and through support of the Integrated Ecosystem Assessment framework. They have made substantial progress working across scientific disciplines to harmonize terminology and approaches, and now have an evolving scientifically-rigorous framework to establish chains of results. As with the indicators work, the Partnership is developing and adapting these frameworks to the needs in the Sound as the analyses are on-going. As in all technologically- or conceptually complex arena, such simultaneous development and implementation of tools is a bit inefficient and frustrating at times, but likely is the best course to follow.

Opportunities: The Partnership must continue to develop and apply the models and tools that tie actions to results and collect the underlying data needed to understand the connections and verify hypothesis and assumptions. These data and tools will not only support the program accountability system but will also allow the Puget Sound community to understand the threats to the system and to prioritize responses. Done properly, this effort may also establish Puget

Sound as a national model for accountability-based ecosystem restoration. There currently is no ongoing analysis and ranking of external stressors to the ecosystem; a serious deficiency that must be corrected. The Partnership must also support the targeted monitoring and identify high priority research that provides the feedback information for the results chain analyses.

Building the Necessary Science-policy Dialog

The Partnership's goals will not be met without a strong interface between science and policy. Most of the difficult issues faced by the Partnership sit at the science-policy interface, and it is important to recognize the limits of either science without policy or policy without science. While there may be several suitable models to encourage dialog between scientists and policy makers, all share the common ingredient of frequent and open dialog focused on outcomes. The organizational structure of the Partnership, advised by three boards (Leadership Council, Science Panel, and Ecosystem Coordination Board) does not lend itself readily to facilitate science-policy dialog. However, all three bodies are essential for developing an effective model for an ecosystem level recovery in which scientific information is fed into policy decisions and translated into implementation of management actions. It is also important that the Partnership, through the Ecosystem Coordination Board, closely monitor actions resulting from implementation of the Action Agenda, providing essential information back to into the science-policy dialog.

Progress: The decision to adopt the principles of adaptive management for the Puget Sound program significantly focused the need for science-policy communication within the Partnership. Adaptive management requires the timely collection and analysis of the proper information and the ability to evaluate outcomes and make informed decisions. While adaptive management is a sound approach in principle, in practice its application to the Puget Sound restoration and protection places incredible stress on the organization, requiring substantial investments in monitoring, analysis, and communication tools.

To address this issue, the Partnership has initiated the development of coordinated Science-Policy workgroups focused on specific topics including: performance management, threats to ecosystem health, implementation strategies, social and outreach strategies, and finance/funding strategies. These groups, consisting of members of the Leadership Council, Science Panel, and Ecosystem Coordination Board, have the tremendous advantage of having the proper mix of people at the table to make informed decisions to the Partnership's management team. While all of these groups have not yet met, early results from the Performance Management workgroup and social and outreach strategies group have been quite encouraging.

Another notable accomplishment in this area is the restructuring of the *Puget Sound Science Update* report to more fully engage the science and policy communities. Based on the Intergovernmental Panel on Climate Change (IPCC) model, the *Update* is being written by author teams led by preeminent scientists charged with preparing synthesis and meta-analysis that will [hopefully] go beyond simply reviewing the available literature. This approach will facilitate peer review by a broader community and will signal the Partnership's interest in applying the best science available.

Opportunities: The Partnership must work to maintain strong science-policy dialog through support of the Science-Policy workgroups, continuation of the *Sound Science Update* process, and by fostering workshops, seminars, and exchanges with the regional, national, and international communities. Of particular importance is better integration of the 'human dimension' elements into the Puget Sound program. Moreover, the Partnership must establish

a strong commitment to technical accuracy, consistency, and open dissemination of technical data and information throughout the organization and participating groups.

While there may be differences of opinions and interpretations of the meaning of data and information from the ecosystem, we strongly agree that the underlying data and facts should be freely available, subject to scientific review, and that open and frank discussions will lead to workable solutions and testable hypothesis.

Building a Sustainable Capacity for Monitoring, Analysis, Research, and Evaluation

Science-based ecosystem management programs are built upon a base of monitoring, analysis, and research built up over many years. While the initial Action Agenda is based largely on science established sometimes decades before, further optimization of the Partnership's stewardship will require investment in focused monitoring, analysis, and research. As the lead Puget Sound agency, the Partnership is responsible for 'carrying the ball' to ensure that science programs targeted on achieving the Partnership's goals for the Sound are maintained and enhanced.

Progress: In 2008, the Science Panel assessed the regional capacity for monitoring, analysis, and research and recommended in their Biennial Science Workplan specific enhancements required to meet the needs of the Partnership. In particular, the Workplan calls for (1) expansion of existing ecosystem monitoring and research programs to provide the information required to employ adaptive management and to document accountability; (2) substantial investment in science personnel to increase the Partnership's capacity to analyze, integrate, and synthesize information into a coherent understanding of Puget Sound; (3) enhancing monitoring of on-going and planned ecosystem restoration programs to explore effectiveness with a sound scientific basis, and; (4) development of exploratory science efforts to allow the Partnership to detect and understand evolving threats.

During 2009, only a small portion of the Biennial Science Workplan has been implemented and, due to resource limitations, significant amounts of capacity building, and enhancements of monitoring and science will not be completed this biennium.

Opportunities: The Partnership must continue to evolve its organizational structure and funding model to insure a sustained science program. Creative cooperation and collaboration among local, state and federal agencies, the tribes, NGO's, universities and others will be required.

Although progress has been made during the past year, much remains to be done and the Partnership must continue to build capacity. At this point a coordinated monitoring program has not yet been developed, the integrated ecosystem assessment framework is incomplete, a risk-based assessment of hazards and threats to the Puget Sound Ecosystem is still needed, an integrated information management system is only nascent, a peer-review process for Partnership science products, policy initiatives, and implementation strategies needs to be put in place, education and outreach activities needs to be infused with a strong scientific and technical basis, and many of the critically needed monitoring, modeling, and assessment tools are missing. Additionally, greater coordination with scientific investigations and monitoring being conducted by Canadian science and resource management agencies needs to be achieved to better inform the decision-making process." The Partnership must continue to send a clear message that peer-reviewed, rigorous science is integral to its operations and planning

Summary

The Puget Sound Partnership is tackling a very large undertaking on an aggressive schedule during difficult economic times. Although implementation of the Action Agenda has just begun, the Science Panel believes that overall the Partnership is moving in the right direction by setting scientific processes in place that will further the recovery efforts using the available scientific information. Ecosystems are inherently complex, variable, and may respond to management actions in complicated patterns that will take time and empirical evidence to evaluate. Therefore it is premature to judge the implementation of the Action Agenda in terms of measurable results on-the-ground.

However, if the Partnership is able to leverage available resources, gain assistance and collaboration of interested parties and stakeholders, focus resources on key science and technical needs, and if it continues to build capacity, set indicators, benchmarks, and goals, foster a strong science-policy interface, and follow the principles of adaptive management, by 2011 implementation should be well underway and demonstrable benefits apparent.

The Science Panel also suggest that the Leadership Council examine the timing of when this progress report is required. As currently mandated, the report is due at the beginning of the state biennium and one year from release of the Action Agenda. To better report on progress, it would be more strategically timed to have this report due June or July of even years. This would provide time to implement funding decisions and actions and still have time to promote needed legislative changes and to update the latest version of the Action Agenda as needed.